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Chapter 1 Introduction

Overview

This report summarizes and interprets monitoring data collected by the Municipal Water Quality Investigations Program (MWQI) of the Department of Water Resources (DWR) from August 1, 1998, to September 30, 2001. Data collected before August 1998 have been presented in previous reports (DWR 1994, DWR 1995a, DWR 1995b, DWR 1996, DWR 1997, DWR 2000, and Woodard 2000). Data collected after October 1, 2001, will be reported in future reports.

The MWQI program was established in 1990. It evolved from 2 earlier DWR programs, the Interagency Delta Health Aspects Monitoring Program (IDHAMP) and the Delta Island Drainage Investigation (DIDI) (DWR 1994). The IDHAMP was initiated in 1983 in response to a 1982 recommendation by a DWR scientific advisory panel. The panel was concerned about pesticides, asbestos, sodium, and trihalomethane precursors and the lack of sufficient knowledge on the quality of Delta water supplies. The DIDI program was established in 1987 to evaluate the effects of agricultural drainage on channel water quality (DWR 1994).

The program began primarily with discrete (grab) samples from which MWQI learned that Delta source waters contain elevated organic carbon, bromide, salinity, nutrients, and, possibly, bacteria and some waterborne pathogens. Drinking water regulations for these constituents became more and more stringent, which led the State Water Contractors (SWC) to place greater emphasis on source water quality control and operational mitigation (Woodard 2003 pers comm). Over the years, MWQI responded by increasing the number of grab sample monitoring stations, increasing sampling frequency, conducting special studies, and, more recently, exploring real-time monitoring capabilities at key stations.

This report presents data collected from 14 MWQI sampling stations in or near the Sacramento-San Joaquin Delta (the Delta). An extensive number of water quality constituents were analyzed for each sample, but only those constituents that are of most concern to the SWC are discussed in this report. Selection of these constituents is based on findings from previous reports and *Sanitary Survey Update Report 2001* (DWR 2001). Water quality constituents of limited concern to the SWC are discussed only for selected stations.

Major water quality constituents examined in this report include organic carbon, bromide, salinity, regulated organic and inorganic constituents in drinking water, and a few unregulated constituents of current interest. Some basic statistics are presented. Seasonal and spatial patterns, differences among stations, and sources of some constituents are also discussed. The raw data for all examined constituents are available online or on CD-ROM (see Appendix B).

Water quality at most stations is not discussed in the context of drinking water standards because source waters are not regulated to meet standards for finished drinking water. However, at some Delta diversion stations, certain constituents are discussed in the context of existing State and federal drinking water regulations and water quality objectives specified in the long-term water supply contracts between DWR and each SWC. This report does not present the details of the regulations, standards, or provisions; the regulations and standards may be found in Chapter 2 of *Sanitary Survey Update Report 2001* (DWR 2001). The *Standard Provisions for Water Supply Contract* between DWR and the SWC is available from the Project Water Contracts unit, State Water Project Analysis Office of DWR.

Interpretations presented in this report are based on either monthly or weekly grab sampling data. Results and interpretations from grab sampling data, especially monthly data, have limitations in explaining spatial and seasonal patterns in the Delta of complex hydrology. Therefore, MWQI collaborated with DWR's Modeling Section to develop computer models using grab sampling data and hydrology information, particularly at tidally influenced locations. Significant progress has been made most notably on a Delta hydrodynamics and water quality transport model (DSM2), which was validated with organic carbon data from March 1991 and December 1997. The model validation results have been presented to the SWC and are available online at http://modeling.water.ca.gov/branch/reports.html. MWQI will use modeling tools to provide more extensive interpretation of data. MWQI staff has been working on a modeling issue paper with DWR modelers, and work is ongoing in the use of models to interpret real-time monitoring data.

Monitoring Stations

General description and geographic locations of the 14 monitoring stations are presented in Figure 1-1. During the reporting period, MWQI collected samples at 12 stations; the Division of Operations and Maintenance (O&M) of DWR collected samples for MWQI at the Banks and Delta-Mendota Canal (DMC) stations. Samples were generally taken monthly; but at the Hood station on the Sacramento River and the San Joaquin River (SJR) near Vernalis station, samples were collected weekly.

Figure 1-1 MWQI monitoring stations, 1998-2001 (map)

To facilitate data presentation and comparisons, the stations were divided into six functional groups:

- American and Sacramento River stations
- San Joaquin River stations
- Delta channel stations
- Delta diversion stations
- Agricultural drainage stations
- Urban drainage station

Stations within each group are either geographically or hydrologically related, or they are the same type of station (Table 1-1). Although the Old River at Station 9 is treated as a channel station in this report, Contra Costa Water District (CCWD) has an intake very close to the station. The Mallard Island station is traditionally considered a station on the Sacramento River, but it receives water from both the SJR and the Sacramento River, and it is

Table 1-1 MWQI monitoring stations, 1998-2001

affected by water from the San Francisco and Suisun bays. CCWD has another intake at Mallard Slough, which is close to MWQI's Mallard Island monitoring station. However, CCWD operates this station only when Delta outflows are high and chloride concentrations are below regulatory limits. The Mallard Island station shows the most seawater influence of all the Delta stations. When Delta outflows are low during dry runoff years or during dry months of each year, water quality (electrical conductivity and bromide in particular) at this station reflects a mixture of fresh and marine waters and, thus, is an indicator of water quality that may be affecting the diversion stations. Therefore, water quality at this station is discussed separately throughout this report.

Definitions of Terms

This report uses certain abbreviations, acronyms, and terminology. A detailed list of abbreviations, acronyms, and terminology is in the Glossary at the back of this report. Some frequently used terms are defined here:

Water year: The period between October 1 of one calendar year and September 30 of the following calendar year is called a water year. The year number is the latter of the 2 calendar years; for example, the 1999 water year runs from October 1, 1998, to September 30, 1999.

Wet months: November 1 to April 30 of each water year

Dry months: May 1 to October 31 of each calendar year

Dry Year, Above Normal Year, and Wet Year: Runoff year types indicating low, moderately high, and high total unimpaired runoff in a watershed, respectively, as defined in http://cdec.water.ca.gov/cgi-progs/iodir/wsihist.

NEMDC: Natomas East Main Drainage Canal

Banks Pumping Plant: the Banks Pumping Plant Head-works station at the start of the California Aqueduct

Contra Costa Pumping Plant: Contra Costa Water District Pumping Plant #1

DMC: A sampling site along the Delta-Mendota Canal at mile 67.2 about 0.87 miles upstream of McCabe Road. Mile 0.00 of the DMC is at the diversion point from the Old River.

Reporting period: The period between August 1, 1998, and September 30, 2001, which is different from the "3 water years" (see below for definition).

Three water years: In this report, data are often compared among water years during the "reporting period" as defined above. The "3 water years" include the 1999, 2000, and 2001 water years. "Water year" is defined above.

Table 1-1 MWQI monitoring stations, 1998-2001

Station	DWR station number	Monitoring frequency
American and Sacramento River stations		
American River at E.A. Fairbairn WTP	A0714010	Monthly
West Sacramento WTP Intake	A02104.51	Monthly
Sacramento River at Hood	B9D82211312	Weekly
Sacramento River at Mallard Island	E0B80261551	Monthly
San Joaquin River stations		
San Joaquin River near Vernalis	B0702000	Weekly
San Joaquin River at Highway 4	B9D75571196	Monthly
Delta channel stations		
Old River at Station 9	B9D75351342	Monthly
Old River at Bacon Island	B9D75811344	Monthly
Delta diversion stations		
Banks Pumping Plant	KA000331	Monthly
Delta-Mendota Canal	DMC06716	Monthly
Contra Costa Pumping Plant #1	B9591000	Monthly
Agricultural drainage stations		
Bacon Island Pumping Plant	B9V75881342	Monthly
Twitchell Island Pumping Plant #1	B9V80661391	Monthly
Urban drainage station		
Natomas East Main Drainage Canal	A0V83671280	Monthly

WTP = water treatment plant

Figure 1-1 MWQI monitoring stations, 1998-2001